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ABSTRACT

This paper presents a study of age differences in children's plan interpretations, interpretations of the interrelationship between actions, goals and outcomes. It is suggested that developmental differences exist which affect children's ability to recognize the necessity for internal and external consistency before labeling behaviors as goal-directed. For purposes of this paper, internal consistency is used to refer to the recognition of a coordinated set of beliefs, knowledge, expectations and other characteristics of an actor which could affect his behavior. External consistency implies that none of the actor's behaviors contradict the characteristics attributed to the actor. In order to study age differences in children's comprehension and use of this information in interpreting an actor's plans, twelve stories representing three story types were presented to 8- and 11-year-old children and to adults. The story types included stories in which an outcome was related to an actor's goal or was a foreseeable or unforeseeable side effect. Results suggest that 8-year-old children were unable to differentiate goal-related outcomes from side effects. Results also suggest that children in both age groups failed to consider adequately questions of internal consistency in their plan interpretations. They also failed to consider information which was contradictory to their interpretation. Adult answer patterns were internally and externally consistent. The paper suggests that this type of research can provide a framework for studying children's comprehension of television programs. (BD)

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Understanding an Actor's Behaviors: Developmental Differences in Plan Interpretations

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Understanding an Actor's Behaviors:

Developmental Differences in Plan Interpretations

Television programs are usually about people doing things. Characters enact sequences of behaviors or engage in interactions with other characters. Although I have not yet used videotaped or filmed materials in my own work, I have been very concerned with how an observer "makes sense" of the actions of another person. Normal adult observers are "recognizing connections" as the action progresses. When subjects of different ages watch a movie, one finds that the younger children do not understand it the way older children and adults do (Collins, 1975; Flapan, 1968). Somehow, these younger children are not "making the same connections" among the actions and events.

My own work and thinking about this problem has grown out of a theory of the observer which was inspired by the work of Heider and is being developed by Charles Schmidt and others at Rutgers University (cf. Schmidt, 1976; Schmidt & Goodson, 1976; Schmidt & Sridharan, 1976; Sridharan & Schmidt, 1977). According to this theory, an observer understands a person's actions by "seeing" them as part of some plan the actor is pursuing. The notion of a plan interpretation is given a complex formal definition in Schmidt's framework, but for purposes here a <u>plan</u> can be characterized as an intentional structure the observer attributes to the actor.

Because plan attributions are constructions or interpretations, observers sometimes disagree as to what a particular actor's plan actually was. But it is interesting that, even in their arguments, adults appear to have some underlying (usually unstated) points of

agreement. According to Schmidt's theory, they recognize that all plan interpretations must adhere to two types of consistency.

First, any plan interpretation must be internally consistent. This means that there is a set of assertions about various psychological states of the actor that are logically interrelated and if one of these assertions is accepted, the rest of them must be also. For example, when an observer says that a certain outcome was the actor's goal, then the observer must also admit that the character performed at least some of his or her actions in order to cause the goal outcome. Assuming these "in order to" links between actions and the goal outcome, requires the observer to also assume that the actor had certain beliefs, knowledge or expectations at the outset of this planned sequence. Specifically, the observer must assume that the actor believed or expected the goal outcome to occur as a result of the planned actions. Of course, this specific foresight and expectation implies that the actor had certain kinds of prior knowledge about the circumstances. To be complete, a plan interpretation must also include some plausible reason or motive that explains why the actor wanted the goal outcome. The reason or motive that the observer identifies must be consistent with his or her beliefs either about the sorts of things actors usually want, or about the peculiarities of the given actor.

Notice that these various assertions--about what the actor's goal was, about why he wanted it, about which actions were done in order to cause the goal, about the actor's prior beliefs, expecta-

tions and knowledge--all must be coordinated with each other. That is, there are logical implications tying together all of these assertions. Adult observers appear to adhere to all of the logical implications and their plan interpretations are internally consistent.

Second, if a plan interpretation is to be acceptable, it must also be externally consistent. This means that the information in the observed sequence cannot contradict any of the numerous assertions about the actor required by the principles of internal consistency. For example, suppose a particular plan interpretation requires the observer to assume that, prior to performing the sequence of actions, the actor believed or knew that certain environmental circumstances existed. But also suppose that there is evidence in the observations that contradicts this assumption: say, the actor came on the scene after these circumstances had been established and he could not observe them. Then, even though this plan interpretation is internally consistent (in that it involves a coherent set of assertions about the actor), adult observers would consider it externally inconsistent, since it is unacceptable in view of the observed evidence.

What about young children's plan interpretations? Earlier I mentioned that children do not seem to "make the same conections" adult observers do when they watch the same movie. If interpreting the plans of the different actors is necessary to understanding the story, then perhaps the young children fail to understand the actions and events in an adult-like way because they arrive at different interpretations of the various actors' plans.

The work I will report today focuses on age differences in plan interpretations. It was a part of a larger project in which I verbally presented very short scenarios to 8 and 11 year old children and to adults and asked subjects a number of questions in connection with each of the stories. Three of the Story Types used in that study will be of interest here. The three Story Types were each represented by four stories and every subject heard and answered questions about all twelve stories.

These three Story Types were selected because they involve very simple circumstances: there was only one actor and he or she acquired a good outcome in the end. The three types were distinguished by the relation between the final outcome and the actor's plan. In one type, the final outcome was the goal of the plan from the perspective of an adult observer. The other two Story Types were designed so that adult subjects should consider the final outcome to be a side effect--not the goal--of the plan. In one type, the outcome was an unforeseeable side effect, while in the other type, the actor might have foreseen the side effect (foreseeable side effect stories).

Subjects answered a number of questions about each of these stories, four of which have a direct bearing on the structure of subjects' plan interpretations: [See Figure 1] (1) Did the actor plan to perform the action that precipitated the final outcome? That is, was this an intentional or an accidental action? (2) Could the actor have known that this action would cause the outcome? That is, could he or she have foreseen the connection between this action and the

final outcome under the circumstances? (3) Did the actor think that his or her action would cause the outcome? That is, did he or she foresee this causal connection? (4) Was the actor trying to achieve the outcome in the story? That is, was this outcome the actor's goal in the situation? It is important that in the course of the interview, the subjects were reminded of the circumstances of the scenario and the questions were reworded if there was any doubt as to whether the subject remembered the situation or understood the question. Moreover, if a child showed an adult-like understanding of the story at any time during the interview, his or her answers to all the questions were scored accordingly. Thus, these data constitute a rather conservative test for age differences in plan interpretations.

There were two main issues of interest: First, to what extent did the different-aged subjects distinguish among the three Story Types when they identified the actors' goals? Not too surprisingly, the younger subjects perceived the outcome as the actor's goal in significantly more of the stories, and there were clear and significant age differences among the children. The 8 year olds even tended to perceive the good outcome as the goal in circumstances where it was actually unforeseeable according to an adult's perspective. [See Table 1. Refer to Table 2 for the results of a 3 x 3 ANOVA on the number of stories where the outcome was perceived as the actor's goal.]

The second issue concerns the <u>reason</u> for these age differences

in identifying the outcome as the goal of the actor's plan. Can these data be explained by differences in external consistency only, or must we say the children violate adult levels of internal consistency as well? Let us consider, then, whether the children's answers to the set of questions were at least internally consistent with respect to the adult's logic of plan interpretations. If, when the children say the outcome was the actor's goal, they also say that he or she intended the action that caused the outcome and that he or she could have foreseen and actually did foresee that the outcome would occur, then their answers would be internally consistent. Then, we could explain the age differences in plan interpretations by saying that the younger children simply do not evaluate the external evidence in an adult-like way. If, on the other hand, the children offer inconsistent patterns of answers, then we must entertain the possibility that they disagree with adults at a more basic level in their plan interpretations. That is, once they have identified (or misidentified) the actor's goal in the situation, the children must be said to violate at least some of the logical implications about additional psychological states of the actor.

In fact, the children did sometimes offer internally inconsistent answer patterns in connection with the side effect stories. Since the 11 year olds nearly always rejected a goal interpretation when the outcome was an unforeseeable side effect, the inconsistent patterns they offered were limited to the cases where they interpreted a foreseeable side effect as the goal. The 8 year olds,

however, offered goal interpretations for both types of side effects, and they offered internally inconsistent patterns of answers in connection with both of these Story Types. Out of all cases where subjects saw the outcome as the actor's goal in side effect stories, 35% of the answer patterns were inconsistent for the 8 year olds, while 30% of the 11 year olds' answer patterns violated the adult's version of internal consistency. The answer patterns of the adult subjects were, of course, internally consistent.

I am citing this evidence as merely suggestive. After all, these proportions of inconsistent patterns are not overwhelming, nor were there any clear differences between the 8 and 11 year old children in terms of the specific types of inconsistent patterns they offered. Keep in mind, however, that only four of the interview questions in this study were relevant to the issue of internal consistency, and the nature of the scoring procedure constituted a very conservative test of inter-age differences. Let us say, then, that there is suggestive evidence here for internal inconsistency in children's plan interpretations, although the nature of this inconsistency is unclear.

At this time, I will conclude by suggesting how age differences in internal consistency can account for these observed differences in identifying outcomes as actors' goals [See Table 1] The fact that an actor receives a good outcome as a result of his actions might lead an observer to entertain the hypothesis that this good outcome was the actor's goal. Adults know there is a lot more

to a plan than a goal; they know that a rather complex assortment of assertions about the actor's beliefs, knowledge, expectations, and so forth must be "filled in" before they have a complete and consistent plan interpretation. In other words, adult observers know all the conditions required for internal consistency. Since they know that accepting this outcome as the actor's goal implies all of these additional assertions about the actor, the adults will be careful to test these implications against the observable evidence. In this way, the requirements of internal consistency serve to guide and focus their search for contradictory evidence. When contradictions between the hypothesis and the evidence are found, the adult observers reject that hypothesis about the actor's plan. Any plan interpretations the adults eventually offer then, are both internally and externally consistent. (See Sridharan & Schmidt, 1977, for a more complete and technical discussion of this reasoning process.)

Young children may follow this same interpretation process: They, too, could begin by assuming that the good outcome observed might have been the actor's goal. But now suppose the children do not recognize all of the additional assertions about the actor that are implied as a consequence of this assumption. If this is so, then, of course, we would find that they will not coordinate their answers to questions about these implied psychological states with their answers about the actor's goal, so their answer patterns will be internally inconsistent. But consider what it would mean if they use such an incomplete internal logic when reasoning about plan interpre-

tations: These children will disagree with adults' plan interpretations even if they follow the adults' reasoning procedure and go on to evaluate the external consistency of plan interpretations in the same way (by seeking contradictory evidence for additionally-implied assertions about the actor). Since the children do not recognize all the additional assertions that must be made, they will fail to search for certain evidence. That is, they will not consider evidence that contradicts the assertions they do not recognize as necessarily implied. As far as they are concerned, such evidence is irrelevant to an interpretation of the actor's plan. As a result, the children will fail to reject hypotheses about the actor's goal more often and in more circumstances when compared with adult observers. This is precisely what the data in Table 1 show. Also consider that this may be one of the reasons the younger children do not "make the same connections" as do the older children and adults when they watch the same movie: the younger children may just not recognize that certain actions and events constitute evidence that is relevant to interpreting the actor's plan.

To the extent that children's understanding of television programs depends on their interpretations of the plans of various characters, then researchers who are concerned with what childern "get" out of a program will need a clearer conception of the development of reasoning about another's plans. The ideas I have shared with you here are one possible framework for guiding research and theory in this realm.

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Table 1

Average Number (Percentage) of Stories

Where Outcome is Seen as Goal

	STORY TYPE		
AGE GROUP	Goal	Foreseeable Side Effect	Unforeseeable Side Effect
8 year olds	4.000 (100%)	2.875 (72%)	1.375 (34%)
11 year olds	4.000 (100%)	3.000 (75%)	0.375 (9%)
Adults	4.000 (100%)	0.833 (21%)	0.000 (0%)

Table 2

Results of a 3 x 3 ANOVA* on the Number of Stories in Which the Outcome was Perceived as the Actor's Goal

Source of Variation	df	F	P
Between Subjects			
Age	2,19	4.[illegible]30	.019
Children vs. Adults (C vs. A)	1,19	4.653	.044
8 yr. olds vs. 11 yr. olds (8 vs. 11)	1,19	5.247	.034
Within Subjects			
Story Type	2,18	98.319	.001
Goal vs. Side Effect (G vs. SE)	1,19	130.286	.001
Foreseeable vs. Unforeseeable (F vs. U)	1,19	41.364	.001
Age x Story Type	4,36	3.954	.009
Age x G vs. SE	2,19	4.950	.019
C vs. A x G vs. SE	1,19	4.653	.044
8 vs. 11 x G vs. SE	1,19	5.247	.034
Age x F vs. U	2,19	4.051	.034
C vs. A x F vs. U	1,19	0.787	.386
8 vs. 11 x F vs. U	1,19	7.316	.014

*The analysis was in accordance with the suggestions of McCall and Appelbaum (1973). This approach makes no assumptions about the variance-covariance structure of the data, since a MANOVA is performed on linear combinations of the original response variables.

INTERVIEW QUESTIONS

1. DID THE ACTOR PLAN TO DO THE ACT?
2. COULD THE ACTOR HAVE KNOWN THAT IF HE/SHE DID THE ACT THEN HE/SHE WOULD GET THE OUTCOME?
3. DID THE ACTOR THINK THAT IF HE/SHE DID THE ACT THEN HE/SHE WOULD GET THE OUTCOME?
4. WAS THE ACTOR TRYING TO GET THE OUTCOME?

Figure 1. Schematic form of the four interview questions relevant to plan interpretations of the stories.